WALT Read and construct stem and leaf plots and calculate different averages such as the mean, mode, range and median.

Success Criteria I can
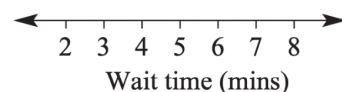-read stem and leaf plots.
-I know how to calculate all the averages and understand the way to work on averages.
-List the numbers plotted in a stem and leaf plot

1).

Stem	Leaf
2	3 3 8 9
3	0 4 7
4	5 5 5
5	7

2).

Stem	Leaf
0	3 7 9
1	2 4 6 8
2	1 2 4 8
3	0 0

3).

Stem	Leaf
9	4 4 7 9
10	6 7 9
11	3 3
12	2 3

4).

Stem	Leaf
12	2 3 7 8 8
13	1 7 9
14	4 4 4
15	5 9

5).

Stem	Leaf
0	2 3 5 9
1	0 3 6
2	2 2 6
3	3 4

6).

Stem	Leaf
17	1 6 9
18	3 4 5 9
19	0 2 8
20	4 8

7).

Stem	Leaf
8	0 0 0 4
9	3 5 5 6 8
10	2 3 6
11	0 5

8).

Stem	Leaf
25	2 5 8 8 9
26	1 4 5 7
27	2 4 8
28	7 8

9).

Stem	Leaf
29	4 5 8 9
30	0 3 5 7
31	0 3 3
32	1 3 4 5

10).

Stem	Leaf
61	7 7
62	2 3 8
63	0 2 8 8
64	2 4 6 6 6

11).

Stem	Leaf
16	2 3 4
17	2 4 6 6 8
18	1 5 8 8
19	1 4

12).

Stem	Leaf
78	7 7 8 9
79	0 2 4 5
80	2 3 6 6 7
81	2 5 5

2 A student records the following wait times in minutes for his school bus over 4 school weeks.

5 4 2 8 4 2 7 5 3 3
5 4 2 5 4 5 8 7 2 6

Copy and complete this dot plot of the data.

2 3 4 5 6 7 8
Wait time (mins)

3 List the data shown in these stem-and-leaf plots.

a

Stem	Leaf
3	2 5
4	1 3 7
5	4 4 6
6	0 2
7	1 1

4|1 means 41

b

Stem	Leaf
0	2 3 7
1	4 4 8 9
2	3 6 6
3	0 5

2|3 means 2.3

Look at the key '4|1 means 41' to see how the stems and leaves go together.

- A **stem-and-leaf plot** uses a stem number and leaf number to represent data.
  - The data is shown in two parts: a stem and a leaf.
  - The 'key' tells you how the plot is to be read.
  - The graph is similar to a histogram on its side or a bar graph, but there is no loss of detail of the original data.

Ordered stem-and-leaf plot

Stem	Leaf
1	2 6
2	2 3 4 7
3	1 2 4 7 8 9
4	2 3 4 5 8
5	7 9

2 | 4 means 24 people

A key is added to show the place value of the stems and leaves.

Stem-and-leaf plot A visual representation of data that groups the scores in a set of data and lists them in order horizontally

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4 Order this stem-and-leaf plot.

Stem	Leaf
12	7 2 3
10	1 4 8 1
13	9 0 2
11	3 0 3 6

12|2 means 122

Stems and leaves need to be placed in numerical order.

▶ Let's start: Ships vs Chops

At a school, Ms Ships' class and Mr Chops' class sit the same exam. The scores are displayed using this back-to-back stem-and-leaf plot. Discuss the following.
- Which class had the most students?
- What were the lowest and highest scores from each class?
- What were the median scores from each class?
- Which class could be described as symmetrical and which as skewed?
- Which class had the better results?

For the data below, digits representing the stem give the tens, and digits representing the leaves give the units.

Leaf Ms Ships' class	Stem	Leaf Mr Chops' class
3 1	5	0 1 1 3 5 7
8 8 7 5	6	2 3 5 5 7 9 9
6 4 4 2 1	7	8 9 9
7 4 3	8	0 3
6	9	1

7 | 8 means 78

- **Back-to-back stem-and-leaf plots** can be used to compare two sets of data. The stem is drawn in the middle, with the leaves on either side.

Scores for the last 30 football games

Winning scores		Losing scores
	7	4 5 8 8 9
1	8	0 0 3 3 6 7
7 5	9	1 2 3 6
8 4 4 1	10	3 9
9 5 0	11	1
3 1	12	

81 lowest winning score → (points to 1 | 8)

Symmetrical (points to row 10)

Skewed (points to row 9)

111 highest losing score → (points to 11 | 1)

10 | 9 means 109

- **Symmetrical data** will produce a graph that is symmetrical about the centre.

- **Skewed data** will produce a graph that includes data bunched to one side of the centre.

Back-to-back stem-and-leaf plot A visual representation of two sets of data that groups the scores and lists them in order horizontally on either side of the stem

Symmetrical data A distribution of data that is balanced on either side of the mean and the median

Skewed data Scores in a set of data that are unevenly distributed around either side of the mean and the median

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1 List the numbers in these stem-and-leaf plots, following the key.

a

Stem	Leaf
3	5 7
4	1 3 8

3 | 1 means 3.1

The same stem goes with each leaf along each row.

b

Stem	Leaf
5	2
6	0 1 7
7	3 5

6 | 3 means 63

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2 a Rewrite this stem-and-leaf plot with the leaves in order from smallest on the left to largest on the right.

Stem	Leaf
5	8 6 1 7
6	7 3 0 2
7	3 5 1 4

b If the stems are units and the leaves are tenths, write a possible key.

In part b, the key must include a decimal point.

3 This stem-and-leaf plot shows the number of minutes Alexis spoke on her phone for a number of calls.

Stem	Leaf
0	8
1	5 9
2	1 1 3 7
3	4 5

2 | 1 means 21 minutes

Count the leaves to find the number of scores.

a How many calls are represented by the stem and leaf plot?
b What is the length of the:
  i shortest phone call?
  ii longest phone call?
c What is the mode (the most common call time)?
d What is the median call time (middle value)?

4 This back-to-back stem-and-leaf plot shows the thickness of tyre tread on a selection of cars from the city and country.

City	Stem	Country
8 7 3 1 0 0 0	0	6 8 8 9
8 6 3 1 0	1	0 4 5 5 6 9
1	2	3 4 4

1 | 3 means 13 mm

06 is just written as 6.

a How many car tyres were tested altogether?
b What was the smallest tyre tread thickness in:
  i the city?   **ii** the country?
c What was the largest tyre tread thickness in:
  i the city?   **ii** the country?
d Find the median tyre tread thickness for tyres in:
  i the city   **ii** the country

Skewed distributions have only a few scores at one end.

e Is the distribution of tread thickness for city cars more symmetrical or skewed?
f Is the distribution of tread thickness for country cars more symmetrical or skewed?

For this set of data:

0.3 2.5 4.1 3.7 2.0 3.3 4.8 3.3 4.6 0.1 4.1 7.5 1.4 2.4
5.7 2.3 3.4 3.0 2.3 4.1 6.3 1.0 5.8 4.4 0.1 6.8 5.2 1.0

   a   Organise the data into an ordered stem-and-leaf plot.
   b   Find the median.
   c   Find the mode.
   d   Describe the data as symmetrical or skewed.

Solution | **Explanation**

a

Stem	Leaf
0	1 1 3
1	0 0 4
2	0 3 3 4 5
3	0 3 3 4 7
4	1 1 1 4 6 8
5	2 7 8
6	3 8
7	5

3 | 4 means 3.4

The minimum is 0.1 and the maximum is 7.5 so stems range from 0 to 7.
Place leaves in order from smallest to largest.
Some numbers appear more than once; e.g. two instances of 0.1 means that the leaf 1 appears twice: 0.1, 0.1, …

b   Median $= \dfrac{3.3 + 3.4}{2}$
              $= 3.35$

There are 28 data values. The median is the average of the two middle values (the 14th and 15th values).

c   Mode is 4.1.

The most common value is 4.1.

d   Data is approximately symmetrical.

The distribution of numbers is approximately symmetrical about the stem containing the median.

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5   For each of the following data sets:
   i   organise the data into an ordered stem-and-leaf plot
   ii   find the median   **iii**   find the mode
   iv   describe the data as symmetrical or skewed
   a   41   33   28   24   19   32   54   35   26   28
       19   23   32   26   28
   b   31   33   23   35   15   23   48   50   35   42   45   15   21   45
       51   31   34   23   42   50   26   30   45   37   39
   c   34.5   34.9   33.7   34.5   35.8   33.8   34.3   35.2   37.0   34.7
       35.2   34.4   35.5   36.5   36.1   33.3   35.4   32.0   36.3   34.8
   d   167   159   159   193   161   164   167   157   158   175   177   185
       177   202   185   187   159   189   167   159   173   198   200

Draft version: Enter the leaves in the same order as in the question.
Final version: Re-write the stem-and-leaf plot with leaves in order. Remember to include the key.

In part **d**, use 16 as the stem for 167.

6 The number of vacant rooms in a motel each week over a 20-week period is shown below.

12 8 11 10 21 12 6 11 12 16 14 22 5 15 20 6 17 8 14 9

   a Draw a stem-and-leaf plot of this data.

   b In how many weeks were there fewer than 12 vacant rooms?

   c Find the median number of vacant rooms.

A shop owner has two jeans shops. The daily sales in each shop over a 16-day period are monitored and recorded as follows.

Shop A

  3 12 12 13 14 14 15 15 21 22 24 24 24 26 27 28

Shop B

  4 6 6 7 7 8 9 9 10 12 13 14 14 16 17 27

   a Draw a back-to-back stem-and-leaf plot.

   b Compare and comment on differences between the sales made by the two shops.

Solution

a

Shop A		Shop B
3	0	4 6 6 7 7 8 9 9
5 5 4 4 3 2 2	1	0 2 3 4 4 6 7
8 7 6 4 4 4 2 1	2	7

1 | 3 means 13

b Shop A sales are generally between 12 and 28, with one low value of 3. Shop B sales are generally between 4 and 17, with one high value of 27. Shop A has a lot more high values than Shop B. Shop B has more low values than Shop A.

Explanation

The data for each shop is already ordered. Stems are in intervals of 10. Record leaf digits for Shop A on the left and Shop B on the right, ordered from the middle to the outside.

Look at both sides of the plot for the highest and lowest values and whether there are a few or many of the small and large numbers.

Highlights and Notes

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7 For each of the following sets of data:

   i Draw a back-to-back stem-and-leaf plot.

   ii State the smallest and largest value in each set and compare the numbers of small and large values in each set.

   a Set A: 46 32 40 43 45 47 53 54 40 54 33 48
            39 43

       Set B: 48 49 31 40 43 47 48 41 49 51 44 46
             53 44

   b Set A: 1 43 24 26 48 50 2 2 36 11 16 37 41 3 36
          6 8 9 10 17 22 10 11 17 29 30 35 4 23 23

       Set B: 9 18 19 19 20 21 23 24 27 28 31 37 37 38 39 39 39
          40 41 41 43 44 44 45 47 50 50 51 53 53 54 54 55 56

   c Set A: 0.7 0.8 1.4 8.8 9.1 2.6 3.2 0.3 1.7 1.9 2.5 4.1 4.3 3.3 3.4
         3.6 3.9 3.9 4.7 1.6 0.4 5.3 5.7 2.1 2.3 1.9 5.2 6.1 6.2 8.3

       Set B: 0.1 0.9 0.6 1.3 0.9 0.1 0.3 2.5 0.6 3.4 4.8 5.2 8.8 4.7 5.3
         2.6 1.5 1.8 3.9 1.9 0.1 0.2 1.2 3.3 2.1 4.3 5.7 6.1 6.2 8.3

Order the leaves with the smallest on the inside and largest on the outside. State whether each set has a few or many of the small numbers and large numbers.

8 a Draw a back-to-back stem-and-leaf plot for the final scores of St Kilda and Collingwood in the 24 AFL games given here.

St Kilda:	126	68	78	90	87	118
	88	125	111	117	82	82
	80	66	84	138	109	113
	122	80	94	83	106	68
Collingwood:	104	80	127	88	103	95
	78	118	89	82	103	115
	98	77	119	91	71	70
	63	89	103	97	72	68

b In what percentage of their games did each team score more than 100 points?

c Comment on the symmetry of the distribution of the scores for each team.

d Which team has scores that are more consistent? Which team has more higher scores?

Percentage = fraction × 100.